PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventors: LESLIE GEORGE ADYE LEONARD and CLARENCE SMITH

909,778

Date of filing Complete Specification (under Section 3 (3) of the Patents Act 1949) Nov. 6, 1958.

Application Date Aug. 6, 1957. *No. 24768/57.*

Application Date Oct. 2, 1958. *No. 31474/58.*

Complete Specification Published Nov. 7, 1962.

Index at acceptance:—Classes 28(2), U; and 94(1), C3B3, C10(A:B1B:B1D3:D2:E:H1:H2B1).

International Classification:—A22c. B65b.

COMPLETE SPECIFICATION

Improvements in Meat-stuffing Machines

We, UNITED GAS INDUSTRIES LIMITED, 51, Lincoln's Inn Fields, London, W.C.2, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to machines for compressing masses of boneless meat to a predetermined cross-sectional shape, encasing and sealing the compressed masses in casings of polythene or other suitable plastic or fibrous flexible materials, or, in preparation for the boiling or steaming of the compressed masses, in sheet metal cases or, for smoking the masses, in perforated metal cases or cages, with or without the presence of plastic or fibrous casings.

The invention has among its objects to effect the compression and casing of all kinds of boneless meat, including hams or bacon, without or in the presence of the rind, as well as meat rolls, such as rolls of sirloin of beef, to effect the compression of the meat masses to any desired cross-sectional shape, to provide improved means for effecting the insertion of a compressed meat mass into a corresponding flexible casing, to provide improved means for tightening the casing about the meat mass and for sealing the casing, to effect the charging of the compressed boneless meat masses into metal cases for boiling or steaming, to provide constructions of such cases that are adapted to co-operate effectively with the transfer assembly of the stuffing machine, similarly to effect the charging of the meat masses into metal cages for submission to smoking, in or without the presence of flexible casings, and to provide a power-operated machine that may be operated in safety by the attendant.

According to the invention a machine for preparing boneless meat masses for cooking or other final treatment for marketing, by stuffing or encasing the meat masses in flexible casings of fibrous or plastic material, comprises a work table having a longitudinal meat trough and complementary cover plate for imparting to a meat mass the cross-sectional shape required of the end product and open at least at one end, the cover plate being adapted for movement to the trough under pressure to close the trough and from the closed position to open the trough and to remain always parallel to the surface of the work table in these movements, an end closure plate for the trough and the cover plate, a nozzle for substitution for the end closure plate, a pressing plate or plunger within the trough which is movable at least through the length of the trough and the nozzle, a sleeve carrying at least one pivoted flap for the engagement of one end of a flexible casing to receive a compressed meat mass, and a clipping mechanism for sealing the open end or ends of the flexible casing containing the meat mass by means of a deformable clip, staple or fastener.

A machine according to the invention for preparing boneless meat masses for cooking, smoking or other final treatment for marketing, by stuffing or encasing the meat masses in metal cases or cages, comprises a work table having a longitudinal meat trough and complementary cover plate for imparting to a meat mass the cross-sectional shape required of the end product and open at least at one end, the cover plate being adapted for movement to the trough under pressure to close the trough and from the closed position to open the trough and to remain always parallel with the surface of the work table in these movements, an end closure plate for the trough and cover plate, a nozzle for substitution for the end closure plate, a pressing plate or plunger within the trough which is movable at least through the length of the trough and

the nozzle, and means for positioning the metal cases or cages in close proximity to the nozzle to receive the compressed meat masses from the nozzle.

It is advantageous that the operation of the movable parts of the machine, or at least certain of them, should be effected by power, for example, pneumatically, by piston and cylinder devices. Where a source of compressed air is not available, however the operating parts may be adapted to be actuated manually through lever and link systems or otherwise. In the use of compressed air, since the power required to close the trough cover plate on the trough is considerable, it is advantageous to control the operation by means of two control valves spaced apart and acting in series. This arrangement is provided to secure that both hands of the operator must be used to effect the operation and there is thus no possibility that a hand or finger of the operator can be trapped as the cover plate is pressed home on the trough.

The trough, the cover plate, the pressing plate or plunger and the nozzle may be exchangeable for others for the purpose of varying the diameter or cross-sectional shape of the compressed masses of heat. In order that the exchanged parts may co-operate with the operating mechanism of the machine, it is essential that the axis of movement of the pressing plate or plunger shall be preserved unchanged. Thus, the work table being formed integrally with the trough of the largest diameter or greatest cross-sectional shape or being prepared for the reception of such trough, there are provided spaced horizontal ledges or supporting surfaces which are adapted to co-operate with outwardly extending flanges or the like provided at the sides of the removable troughs and which rest upon the horizontal ledges or supporting surfaces. It is thus necessary for troughs of the smaller diameters or smaller cross-sectional shapes to present outwardly extending flanges or the like having a uniform overall width the same as those of the troughs of the larger diameters or greater cross-sectional shapes and such flanges or the like must be of the respective depths to position a particular trough with its axis coinciding with the axis of movement of the operating rod of the pressing plate or plunger when received on the ledges or supporting surfaces of the table or of the largest trough, if it is integral with the table.

The clipping mechanism provided for the sealing of the open end or ends of the flexible casings is adapted for the use of deformable U-shaped clips, staples or fasteners. The mechanism is mounted upon a table that co-operates with the work table of the machine and comprises a housing or frame suitably slotted for the reception of the end of the casing to be sealed, a clip-supporting die member that is movable without the housing or frame in the direction of the slotting and at least one die member movable in the housing or frame in a direction that is transverse to the path of movement of the first die member and to the outer or remote side of the end of the casing in the slotting, the movement of such transversely movable die member or members being imposed by the first die member, which is moved by force applied to it in the direction of the slotting of the housing or frame. A rotatable cam device, also mounted in the housing or frame, may be adapted to effect the operative movements of the two die members in one direction of its rotation and to permit the controlled return movements of the two die members in the other direction of its rotation, the housing or frame being slotted on each side of the path of one of the die members for the reception of the end of the casing to be sealed. Alternatively, the movements of the die members may be effected by power means.

There may be provided a magazine for a supply of the fasteners, which magazine is adapted to feed the fasteners singly into the path of one of the die members, under the action of a spring or of gravity.

Similarly, the return movement of the two die members may be effected under spring action or under the action of gravity.

The rotatable cam device may be adapted to be rotated directly by a hand lever or the like or the latter may act upon the cam device indirectly through gearing.

In order that the casing may be tightened about the compressed mass of meat before the fastener is applied, the table may be provided also with a casing-gripping device and such device and the housing or frame may be relatively movable upon the table in such manner that, after the open end of the casing has been gripped, the distance between the device and the housing or frame may be increased for the purpose of taking up the slack of the casing and thus pressing the cased mass of meat against the housing or frame before the fastener is closed about the pleated or twisted end of the casing.

The relative movement of the device and the housing or frame is advantageously effected by power means, as defined in respect of the meat-casing machine hereinbefore described. It may be effected, however, by manually operated means.

A common table may be provided for the machine and the device and the power installation may also be common.

In the marketing of boiled or steamed or smoked boneless meat masses, it is usual for the masses to be formed to a substantially rectangular cross-section. It is necessary therefore that this cross-sectional shape shall be maintained until the completion of the treatment of the masses of meat. In boiling or steaming there is involved a degree of shrinkage that

may result in the formation of cavities that may become filled with jelly, if the masses of meat are not maintained under endwise pressure during the treatment. In smoking the masses of meat the problem arises of retaining the cross-sectional shape while permitting the meat to be subjected effectively to the smoking operation, whether enclosed in a permeable plastic or fibrous casing or not.

Since the trough and the trough cover plate of the stuffing machine may be provided of any cross-sectional form required, they may be readily adapted to meet the market for meat masses of substantially rectangular or any other cross-sectional form.

If the compressed meat masses are intended for boiling or steaming, the metal cases used with the stuffing machine to receive the masses from the trough are of open ended tubular form that are adapted to be closed at each end by closure plates one or both of which may serve as an abutment or abutments for compression springs that press against the mass of meat in the case a presser plate or plates that will take up the shrinkage of the meat mass. If the meat masses are intended for smoking, the metal cases are replaced by metal cages, also of open ended form and which may or may not be adapted to receive closure plates. The cages may be used with flexible plastic or fibrous casings.

The cases or cages are adapted to be aligned longitudinally on the axis of the trough of the stuffing machine and to be positioned or advanced axially to co-operate with the nozzle of the machine for the reception therefrom of the meat masses. Any advance movement of the cases or cages may be effected manually or by power.

A stop or stops of suitable form may be provided to resist the tendency for rearward movement of the cases or cages under the thrust of a mass of meat as it enters the case or cage.

The invention is illustrated, by way of example, in the accompanying drawings.

Figure 1 is a side elevation of the meat casing machine.

Figure 2 is a corresponding end elevation.

Figure 3 is a section on the line 3—3 in Figure 1.

Figure 4 is a detail section on the line 4—4 of Figure 2.

Figure 5 is a detail section on the line 5—5 of Figure 2.

Figure 6 is a diagram of the compressed air supply and control.

Figure 7 is a side elevation of the two devices and the table supporting them.

Figure 8 is an end elevation corresponding to Figure 7.

Figure 9 is a detail view of the clipping device.

Figure 10 is a view at right angles of Figure 9.

Figure 11 is a detail view of the casing-locating slide of the clipping device.

Figure 12 is a detail view of the gripping device.

Figure 13 is a view at right angles to Figure 12.

Figure 14 is a detail view of the clip-supporting die member of the clipping device provided for operation by compressed air.

Figure 15 is a diagrammatic perspective view of the additional mechanism for operating with the metal cases and cages. The figure illustrates an instance of a metal case carried on a cradle supported by rollers on rails, the cradle and case being shown as approaching the operative position in relation to the nozzle of the stuffing mechanism and showing the retractable stops in the act of rising to the operative position.

Figure 16 is a multi-sectional view of a metal case upon the cradle, the rails for the cradle, the table top, the extension of the piston or plunger rod of the stirrup-operating air cylinder, the driving mechanism between the cradle and the extension rod and between the extension rod and the retractable stops.

Figure 17 is an end view of the right hand end of the metal case and cradle as shown in Figure 16.

Figure 18 is a view in elevation of a front cover plate for the metal cases or cages.

Figure 19 is a sectional side elevation of a modification of the additional mechanism, illustrating a metal cage mounted on a differing form of cradle and operating mechanism, the cradle and cage being shown in the operative position in relation to the nozzle, its sleeve and the collapsible flop.

Referring to Figures 1 to 6 of the accompanying drawings, there is provided a table 1 with a stainless steel working surface 2. At the one end there is formed or fitted a deep longitudinal trough or mould 3 the lower part of which is of semi-circular cross-section. The trough 3 is closed at the inner end 4. As shown in Figure 3 there are formed near the table surface at each side a seating or flange 5 on which are received the lateral flanges 6 of the exchangeable troughs, such as 7. The seatings or flanges may be formed alternatively as parts of the table surface, so that the trough 3 is also removable.

The trough cover plate 8 is of semi-circular cross-section and of stainless steel. It may be provided with strengthening transverse ribs. It is further provided with a channel-section supporting frame 9, the depth of the channel depending upon the diameter or cross-sectional form of the trough. The supporting frame 9 is adapted to be secured to a carrying plate 10 mounted at the extremities of two spaced supporting arms 11, which are curved above the carrying plate 10 and then extend downwardly through transverse slots in the table surface 2 and are

pivoted at their lower ends to a cross-head 12 carried by the piston rod 13 of a compressed air cylinder 14, suitably supported in a fixed position in relation to the table 1. An intermediate part in the length of each arm 11 is inclined or angled with reference to the remaining parts of the arms, which may lie in substantially parallel planes. The inclined parts of the two arms 11 co-operate with corresponding rollers 15 carried by a horizontal spindle 16 of fixed position. The arms 11 are caused always to tend to maintain contact with the rollers 15 by the action of tension springs 17 which are anchored at one end to the arms 11 beneath the inclined parts thereof, the outer ends of the springs 17 being anchored to fixed lugs or the like at the front of the table 1. The purpose of the particular formation of the arms is to ensure that, when the cover plate 8 is in the closed position on the trough 3, the curved parts of the arms clear the table surface 2 and the rollers 5 then bear upon the arms near to the upper ends of the inclined parts of the arms. The piston rod 13 is then extended outwardly and downwardly near to the limit of its stroke. When the cover plate 8 is lifted from the trough 3, the piston rod 13 moves inwardly and the arms 11 rise, so that the rollers 15 impose a rearward movement of the arms 11 as they contact the inclined parts of the arms. This rearward movement continues until the rollers are near the lower ends of the inclined parts of the arms. The cover plate 8 is then well to the rear of the trough 3 and does not interfere in any way with the operation of charging the trough with a mass of meat. As the force exerted by the arms 11 in closing the trough is considerable, there is a tendency for the arms to be deformed or strained. This tendency is resisted in the particular construction by the provision of reinforcing arms 18 welded between the upper and lower ends of the arms 11. If weight is not of importance, the same result may be secured by forming the arms 11 of heavier cross-section or of greater depth from the front edge to the rear edge.

Through the closed end 4 of the trough 3, or through a fixed plate if the trough 3 is removable, there extends the piston rod 19 of a compressed air cylinder 20 serving for the purpose of compressing the meat in the trough and ejecting it from the trough. The extremity of the rod 19 is adapted to receive the plunger plate 21, or a plunger plate that is suited to the diameter or cross-sectional shape of the trough in use. It will be understood that the axis of each trough, when the trough is in the operative position, coincides with the axis of the piston rod 19.

The table 1 ends at the open end of the trough 3 in a vertical wall 22 in which is an opening to correspond with the open end of the trough of the largest cross-sectional area. Above and beneath the opening there are provided parallel horizontal slideways 23, in which is slidably received the trough closure plate 24 which, in this particular construction, serves also as the nozzle plate. The plate is rectangular in form and twice the width necessary for the closure of the open end of the trough. At the front end there is a handle 25, by which the plate is moved between its two limiting positions. When the plate is moved to the limit rearwardly the trough is closed. When the plate is drawn forward until a flange at the rear edge contacts the slideways 23 the nozzle 26 is presented to the open end of the trough. The nozzle is a sheet metal cylinder. It is enveloped by a slidably fitting cylindrical sleeve 27 at the outer end of which are hinged several, for example, eight, equally spaced longitudinally extending, transversely curved flaps 28, the outer ends of which are dimpled outwardly. Thus, when the sleeve 27 is moved along the nozzle 26 the flaps 28 are expanded along the wall of the nozzle 26. In order to effect the movements of the sleeve 27 on the nozzle 26 the sleeve has pivoted to it on a horizontal diameter a stirrup 29 which has a radial lug 30, linked by the bear 31 to a lug 32 fixed close to the plate 24 at the top of the nozzle 26. Diametrically opposite the lug 30 the stirrup bears a further radial lug 33, through which the movements of the sleeve are effected by the piston rod 34 of a compressed air cylinder 35 mounted in fixed position on the table 1 beneath the trough 3. Since the plate 24 has to move transversely to the axis of the cylinder 35, it is necessary to make provision for movement of the lug 33 towards and away from the axis of the cylinder 35. Thus, the piston rod 34 (Fig. 5) has a head 36 that bears a horizontal pin 37 set parallel with the plate 24. The pin 37 is adapted to engage an elongated radial slot in the lug 33. When the piston rod 34 is at the inward end of its in stroke the pin 37 registers with a guide rod 38 which extends horizontally along the wall 22, to which it is fixed at two positions at the rear end. Its forward end lies with only small clearance from the pin 37. Modifications of this arrangement may be adopted, if desired. Thus, pin 37 may extend laterally in the place of the guide rod 38, its rear end being provided to move along a guide placed horizontally parallel with the axis of the cylinder 35, the extended pin 37 being provided with a roller, if thought desirable. Again, the stirrup 29 may be adapted for operation manually. For this purpose the arrangement may be reversed so that the lugs 30 and 32 and the link 31 are beneath the sleeve 27 and a handle takes the place of the lug 33 at the upper side of the stirrup.

Referring in particular to Figures 1 and 6, the compressed air for effecting the operation of the machine is supplied by way of an air

line valve 39 and a mist-lubricant device 40 to a control stop cock 41 and thence to a main line 42, with pressure gauge 43. The cylinder 14 for operating the trough cover plate 8 is served by way of a control device or relay valve 44 that is actuated through the push button valve 45 to lift the cover plate and through the series push button valves 46 and 47 to lower the cover plate and press the meat in the trough. The cylinder 20 is controlled by a two-position foot valve 48 which receives the supply from the line to the top of the cylinder 14, so that it may only be operated when the trough cover plate is in the closed position. The cylinder 35 receives its supply from the main line 42 by way of a push and pull valve 49, the lines to each end of the cylinder being provided with flow regulators.

The associated clipping and gripping devices are mounted upon a separate table 50 which has at the right hand end an extension 51 the surface of which is well beneath the level of the axis of the cylinder 35 and is adapted to butt with its end against the wall 22 of the table 1. The table 50 is thus suitably positioned for the transfer of the cased meat from the nozzle 26. Immediately adjacent the extension 51 the table 50 bears a removable platform 52, of sheet metal and of a concave cross-section, upon which the compressed and cased meat is received from the nozzle 26. The elevation of the surface of the platform is such that the cased meat is well placed for the operation upon it of the clipping device 53. Thus, it is necessary to provide a platform for each size of cased meat leaving the nozzle 26. Alternatively, the platform may be hinged at the end adjacent the extension 51 and be provided with an adjusting screw or other means for adjusting the height of the end near to the clipping device. The platform 52 or the table 50 may be further provided with a turntable for turning the cased meat for the second clipping operation.

The clipping device has a housing formed by spaced parallel, substantially rectangular plates 54 and 55 having identical vertical slots 56 in the upper ends, for the admission of the free end of the casing of the meat after gathering. The plates 54 and 55 are spaced by front and rear bars 57 that form a slide for a clip-supporting die member 58 and may also serve for the securing of the device to the table by means of a transverse angle iron support beneath the table surface.

At the upper ends the plates 54 and 55 are spaced by angle blocks 59 which border the angular parts of the slot 56, define the upper surfaces of the slides for the two die members 60 and back the latter against the pressure exerted by the die member 58 and finally as housings for compression springs 61 that tend always to return the die members 60 to their inoperative positions. The slides for the die members 60 are completed beneath the members by rectangular blocks 62 which also space the plates 54 and 55, serve to assist in guiding the die member 58 in its movements and as housings for compression springs 63 which tend always to assist gravity to return the die member 58 to its inoperative position.

The die member 58 is in the form of a three-pronged fork. The middle limb 64, which is relatively short, is the operative part of the members and serves to support the U-shaped clip to be applied to the casing of the meat, the clip having its limbs directed upwardly. The outer limbs 65 extend upwardly to the level of the die members 60 and are there formed, on their inner faces, with inclined cam surfaces 66 which, in the upward movement of the member, force the die members 60 together against the action of the springs 61. The die members 60 are formed with undercut operative surfaces 67 in the adjacent vertical faces which are pressed into contact under the action of the cam surfaces 66. These operative surfaces 67 serve to curl the limbs of the clip about the gathered end of the casing, under the pressure of the die member 58.

The upward or operative movements of the die member 58 may be effected by hand or by power. As illustrated particularly in Figure 9, a rotatable cam 68, pivoted at 69 on a horizontal spindle, bears upon the lower face of the die member 58 and is provided with an operating arm or lever 70, which extends forwardly through a vertical slot in the front part of the skirt of the table 50. Alternatively, as illustrated in Figure 14, the die member 58 may be coupled to the piston rod 71 of a compressed air cylinder 72, which is double-acting and provided with a corresponding control device. With hand operation as illustrated in Figure 9 it is useful to link the cam 68 with the die member 58 by a pivoted link 73.

While preferable, it is not essential that the die member 58 should be provided with three limbs or that there shall be two die members 60. A single member 60 may carry both operative faces 67 and may be moved by the die member 58 to span the slots 56.

The plate 55 of the housing of the clipping device may be provided with means (Fig. 11) for locating the gathered end of the casing to be clipped. Thus, a fixed plate 74 having an inclined upper edge adjacent the slots 56 may be formed at the position which is to be occupied by the casing end with a substantially semi-circular recess 75. Co-operating with this plate 74 there is a second, slidable plate 76 that has a complementary formation at the edge that contacts the plate 74. By the two plates the gathered end of the casing is compressed into a compact form about which the limbs of the clip may be readily passed on the upward movement of the die member 58.

The clips are supplied to the die member 58 as required from a horizontally disposed magazine 77 the near end of which is fitted in an opening in the plate 54 and the outer end of which is supported on a pedestal 78. The magazine is of sheet metal and of a cross-section to take a succession of the clips with their limbs pointed upwardly. The follower is provided with a lug 79 that extends through a longitudinal slot in the bottom of the magazine and is coupled to a cord 80 which passes over a pulley of fixed position and supports a weight 81. A guide rod 82 may extend longitudinally along the magazine and through the follower with clearance. It may be formed with a downwardly directed spur 83, which may constrain the guide rod in its operative position by engaging between two oppositely disposed spring catches 84 mounted on the outer face of the pedestal 78. Alternatively, the follower may be acted upon by a compression spring and the guide rod may be coupled to the follower by a collar on the advancing side of the follower. The guide rod has the spring coiled about it at the outer side of the follower. The magazine being open at the top, when it is to be charged with clips, the guide rod is drawn outwardly to compress the spring and to retract the follower. The guide rod may be locked by a stop pin when in the retracted position for the charging of the magazine. This alternative renders unnecessary the use of the cord and weight.

The casing gripping device, as illustrated more particularly in Figure 12, comprises a stout angled body 85 of which a vertically disposed limb extends through a longitudinal slot in the surface of the table 50 for connection at 86 to the piston rod of a double-acting compressed air cylinder 87 set horizontally in fixed position beneath the surface of the table. A second limb 88 of the body 85 extends transversely above the surface of the table. At the angle of the body there is formed a rectangular slot 89 which embraces with clearance the clip magazine 77. The upper surface of the upper limb or wall of the slot 89 forms one of the jaws 90 of the gripping device. The upper jaw 91 is a lever that is pivoted at 92 to a carrier 93 that extends along and in fixed relation to the limb 88. The jaw 91 is further pivoted at 94 to a hand lever 95 that has its fulcrum 96 at the outer end of a strut 97 the lower end of which may be pivoted to or bear upon the carrier 93. Between the pivotal points 92 and 94 there is connected at 98 a tension spring 99 that is anchored at its other end to the carrier 93. By suitable selection of the positions of the pivotal points 92 and 94 and the point 98 and of the disposition of the strut 97 and of the anchorage point of the spring 99, it is possible to ensure that if the hand lever 95 is lifted it positively opens the jaws whereas it positively closes the jaws when depressed to its lowest position, in which it tends to remain until lifted. The lower end of the strut 97 may be of a ball shape and bear against the inner end of a compression spring 100, which lies along the carrier 93 and bears upon an abutment at the remote end. Instead of a ball end, the strut 97 may have at the lower end a pivoted fork the stem of which lies within the spring 100. The remote end of this spring 100 may bear upon an adjusting screw 101. A suitably shaped sheet metal cover encloses the pivots and the connected parts and is conveniently secured to the limb 88 of the body 85.

The operation of the cylinder 87 may be controlled by a two-way foot control device 102. It may receive compressed air from the air line supplying the casing machine, to which it may be coupled by a connector 103.

It is unimportant whether it is the gripping device or the clipping device that is moved by the cylinder 87 for the purpose of tightening the casing about the meat before the second clip is applied. If it is the clipping device to which movement is imparted then provision must be made for the support of the clip magazine wholly from the housing of the device.

In operating the casing machine and the associated clipping and gripping devices as hereinbefore described, an open ended fibrous or plastic casing is prepared at one end by forming a cuff of several thicknesses by turning the end of the casing inside out. The closure plate 24 is drawn forward to position the nozzle in register with the trough and to engage the lug 33 of the stirrup 29 with the pin 37, so that by operation of the cylinder 35 the sleeve 27 may be moved outwardly to collapse the flaps 28. The cuff of the casing is then passed over the flaps and the cylinder 35 again operated to return the sleeve and thus expand the flaps to engage the casing. The plate 24 is then pushed to its rear position to place the closure part in line with the trough. The cover plate of the trough being in the open position, a mass of boneless meat is rolled upon the surface 2 of the table 1 and is placed in the trough. The cylinder 14 is then operated to lower the cover plate and to press the meat to shape in the trough. While the cover plate is still in the closed position the foot valve 48 is operated for a short period to compress the mass of meat longitudinally. The plate 24 is then drawn forward to position the nozzle and the casing attached to it in register with the trough. The foot valve 48 is again operated, this time for carrying out of the full stroke of the plunger 21 to eject the compressed mass of meat into the casing. The cylinder 35 is then caused to move the sleeve 27 outwardly to collapse the flaps 28 and to permit the cased meat to be withdrawn. The foot valve 48 is released so that the plunger 21 is retracted and the cover plate of the trough is then raised.

The cased meat is now on the platform 52.

One end of the casing is gathered and inserted in the slot 56 of the clipping device. The slide 76 is then closed to compact the gathered casing end. A clip is then applied by the operation of the die members. The slide 76 is withdrawn and the casing removed from the slot 56. The cased meat is then reversed in position for the sealing of the second end. Before applying the clip the gathered end of the casing is inserted, as before, in the slot 56 and the slide 76 closed. The jaws of the gripping device are opened by raising the hand lever 95. The foot valve 102 is then depressed to cause the cylinder 87 to move the gripping device near to the clipping device. The gathered end of the casing is engaged by the jaws on the depression of the hand lever 95. The foot valve 102 is then released and the cylinder 87 moves the gripping device away from the clipping device, thus tightening the casing about the meat. While the tension on the casing is maintained the clip is applied. The tension on the casing may then be relieved by depressing the foot valve 102, whereupon the jaws may be opened by lifting the hand lever 95 and the casing then released from the clipping device.

In the clipping device the position of the magazine in relation to the operative part of the die member 58 may be such that when the die member is in its normal position of rest the magazine feeds a clip onto the middle limb 64. It is preferred, however, that the position of rest of the limb 64 shall be such that the upper or operative end masks the outlet from the magazine. Thus, a slight lifting of the hand lever 70 is required to release a clip from the magazine to the limb 64.

The stuffing machine hereinbefore described is readily adapted for use in the preparation of compressed boneless meat masses that are intended for boiling or steaming or for smoking.

If the boneless meat is intended to be boiled or smoked, it is required usually that the treated masses shall have a rectangular cross-section, and, as hereinbefore stated, the trough 7, the trough cover plate 8, the pressing plunger 21 and the nozzle 26 are provided of a corresponding cross-section or shape.

If the meat is to be boiled or steamed it is received into an open-ended tubular metal case 104, that is of the corresponding cross-section and is advantageously of stainless steel. As illustrated diagrammatically in Figures 15 to 18 of the accompanying drawings, the case 104 is adapted to be closed at the rear end by a cover plate 105 that may serve as an abutment for a compression spring 106 that is in fixed or contact relation at the forward end with a presser plate 107 that is slidable within the case and that is positioned normally intermediate the ends of the case. When the mass of meat 108 has been ejected from the trough 7 and cover plate 8, through the nozzle 26 by the pressing plunger 21 into the case 104, the open forward end f the case may be closed by a similar cover plate 109 that may be as represented in Figure 18 and may also form an abutment for a second compression spring that serves to press a presser plate 110 into contact with the mass of meat 108 so that it is confined under pressure between the two presser plates 107 and 110. Thus, in the operation of boiling or steaming the mass, the shrinkage is taken up by movement towards one another of the presser plates, or of one of them towards the other, the mass retaining the cross-section that has been imparted to it.

In order to facilitate the charging of a meat mass ejected from the nozzle 26 into a case 104, the latter may be supported upon a table 111 that takes the place of the table 50 and is thus aligned with the table 1. As illustrated in Figure 15, the table top may be provided with spaced rails 112, conveniently of angle section upon which the case 104 may be movably supported in a cradle 113 having, on each side, flanged rollers 114 to engage the rails 112, the assembly being such that the open forward end of the case 104 may be aligned in close proximity to the nozzle 26. Since the meat masses are not usually to be received into flexible casings, the nozzle need not be provided with the sleeve 27 and the flaps 28.

The open ends of the case 104 are suitably provided to permit the ready fitting of the cover plates 105 and 109. Thus, the said ends of the case may be formed with outwardly directed flanges 115 with which oppositely curled or bent-over lateral edges 116 on the cover plates may engage with some degree of pressure.

In a metal case if adapted for use as described with presser plates and a compression spring or springs, means may be provided for the or each compression spring and pressure plate to permit the presser plate to be drawn towards the corresponding cover plate, while a mass of meat is received into the case from the nozzle 26. For example, a pressure plate may be provided with a stem that lies in the axis of the case and may project through the associated cover plate, which may be slotted or apertured to receive it. Thus, the stem may be drawn towards the cover plate and may there be detained by a pin or clamp. The stem may be readily released to carry forward the presser plate into contact with the mass of meat. Such arrangement may also permit the cover plate, presser plate and compression spring to be fitted to the open end of the case after the latter has received the mass of meat.

As illustrated in Figure 16, the forward presser plate 110 may be adapted to serve as the trough pressing plate or plunger and may be constructed accordingly to be detachably

carried by the plunger rod 19. Thus, when the rod 19 moves rearwardly for the ejection of the compressed mass of meat from the trough through the nozzle 26, the presser plate 110 serves as the plunger and forces the mass into the case 104 before it, but is left within the case in contact with the mass on the return movement of the rod 19. For the purpose the presser plate 110 may be formed or provided on the forward face with a socket or sleeve 117 that may slidably fit the plunger rod 19 or on a cap or sleeve 118 fitted thereon, for instance, by engagement with the screw thread that may serve to retain upon the rod the more usual pressure plate or plunger. Relative rotation of the presser plate 110 about the rod 19 may be avoided by the formation of a flat or flats or a key and key-way respectively on or in the contacting surfaces of the socket or sleeve 117 and the cap or sleeve 118, unless the contacting surfaces of the socket or sleeve 117 and the cap or sleeve 118 are of rectangular or polygonal cross-section. The forward cover plate 109 is applied to close the forward end of the case 104 after the presser plate 110 is therein. A compression spring may be interposed between the presser plate and the forward cover plate.

Since the case has to withstand the frictional pressure exerted by the mass of meat as it is forced into the case, it is necessary that the latter should be constrained in the required position in proximity to the nozzle 26. Thus, there may be provided a stop or stops against which the rear end of the case 104 or the rear cover plate 105 presses or the case may be received in a seating or carriage adapted to resist the rearward movement of the case. In Figure 16 there is illustrated the provision of retractable stops that engage the rear cover plate, the case being mounted in the cradle or carriage 113. The manner in which such stops may be operated will be hereinafter described.

It will be appreciated that, since plastic casings for the masses of meat treated in the metal cases are not essential, the presence of the sleeve 27, the hinged flaps 28, the stirrup 29 and the power cylinder 35 is immaterial to the charging of the cases, but the presence of the power cylinder 35 may be utilised with advantage in connection with the suitable positioning of the cases in relation to the nozzle 26 and the resistance offered by the cases to the frictional force exerted upon them by the entering masses of compressed meat. The stroke of the ram or piston rod 34 of the power cylinder 35, or other sleeve-operating element, is considerably greater than the actual travel of the sleeve 27 required for its effective operation and this fact may be applied with advantage to effect automatically the movement of the case into the required position in relation to the nozzle 26. Thus, for example, an axial extension 119 of the piston rod 34, as represented in Figures 16 and 17, may be carried in spaced bearings 120 fitted beneath the surface of the table 111 and may serve to engage a driving lug 121 that is in fixed relation to the cradle 113. For the purpose the driving lug may be provided to extend through a longitudinal slot 122 in the table surface and to receive the axial extension 119 with clearance through a corresponding bore 123. The driving relation of the extension with the driving lug 121 may then be determined by adjustable driving clips or elements 124 that are slidable upon the extension rod and may be secured thereto in any desired position before and after the driving lug 121. Thus, it is rendered possible to determine the precise moment in the travel of the extension rod 119 when the cradle 113 shall be picked up in the directions of approach to or withdrawal from the nozzle 26. Alternatively, the extension 119 of the rod 34 may carry an upwardly directed horn or finger that extends through a longitudinal slot such as 122 and that may engage the rear end or some other part of the case, or of the cradle or carriage that may support the case and may be movable on a slideway or on rails, as in the case of the cradle 113.

The extension 119 of the ram or piston rod 34 may also be applied to the purpose of erecting a stop or stops for resisting the tendency for the rearward movement of the case under the frictional pressure of the entering mass of meat. Thus, in a convenient construction, as illustrated in Figure 16, the extension 119 may carry near or at the rearward end a transverse and horizontally disposed cross-head 125 that bears at each end a stub spindle for a roller 126 adapted to run upon one of the spaced longitudinally disposed rails 127 in the form of lengths of angle metal fitted beneath the table surface 111 in positions equally spaced from the extension rod 119, the horizontal flanges of the angles serving to support the rollers 126, while the vertical flanges, at the outer sides of the rollers, may be secured to the under surface of the table or to the frame-work supporting the table 111. The rollers 126 and the rails 127 thus may serve to support the rear part of the extension rod 119 on its forward and rearward movements, although the rod may be supported also in a fixed bearing to the rear of the cross-head 125. At a position determined by the required disposition of the case 104 in relation to the nozzle 26 and having the same spacing as the rollers 126 there are set two identical stop or cam elements 128 that are pivoted on a spindle or spindles 129 adapted for adjustment of position along corresponding slots formed in the vertical flanges of the angle metals 127. The stop or cam elements 128 rise and fall in vertical planes through corresponding longitudinal slots 130 in the table 111. The forward edges

of the stop or cam elements 128, when in the erected positions, act to contact the case 104 or the rear cover plate 105 when in the required position. The said forward edges of the stop or cam elements may be coupled together to determine or limit the fall of the said elements or they may be permitted to fall into contact with the horizontal flanges or rails 127. The rear edges of the stop or cam elements 128 adjacent the pivotal axis 129 are curved to a concave formation such that, in the erected position, the corresponding roller 126 may be received in the curve and thus serve to support the stop or cam element in the erected position. The major portion of the rest of the rear edge of each stop or cam element may be formed to a curve that is the arc of a circle struck from a centre offset from the pivotal axis of the element or is otherwise curved or inclined in such manner that, when in the retracted or lowered position the said part of the rear edge may cooperate with the corresponding roller 126 for the erection into the operative position of the stop or cam element, the roller 126 being then nested in the concave curve of the rear edge of the element. Thus, the roller 126 and the rail 127 upon which it rests takes the stress imposed on the case by the tendency to move rearwardly under the pressure sustained. The shape of each stop or cam element and the relative disposition of the pivotal axis may be such that the elements tend to fall into the retracted position, either by gravity or under light spring action, on the withdrawal of the rollers 126 from their support. Instead of being clamped in position, the spindle or spindles of the elements 128 may be slidably received in the slots or slideways in the vertical flanges of the rails 127 and may be maintained normally at the rear ends of the slots or slideways by spring action.

If it is thought desirable, a retractable stop mechanism, such as that hereinbefore described, may be adapted to effect the movement of the case to the operative position in relation to the corresponding nozzle, in the place of the driving lug or upwardly directed horn or finger.

If the boneless masses of meat are intended to be smoked, they are advantageously received into open-work cages from the nozzle of the stuffing mechanism, each cage being of a cross-sectional shape according with that of the trough and trough cover plate in use. As illustrated in Figure 19, the cage may be formed of a wire or rod mesh, the wires or rods being welded together to form the required cross-section of the cage. Thus, the cages 131 may be formed from spaced longitudinal wires or rods 132 with spaced vertically set loops 133. The longitudinal wires or rods 132 are advantageously set on the inner side of the loops of transverse wires or rods 133, to facilitate the entry of the compressed masses of meat. The cages may be made, however, in other forms. Thus, they may be made of stout perforated sheet metal in which the greater portion of a unit area is formed by openings or perforations. The cages may be adapted for use in the manner hereinbefore described with reference to the metal cases and may be provided, like the cases, to receive cover plates and, if desired, presser plates and compression springs.

When a cage is to be used with a permeable polythene or like flexible casing, in which the mass of meat is to be received, the nozzle 26 with which it is used requires to be provided advantageously with one or more collapsible flaps, such as 28, for engaging the receiving end of the flexible casing in the manner described with reference to the stuffing mechanism. If the cage is of rectangular cross-section, the nozzle 26 need only be provided with a single flap 28 which is carried by a flap-operating sleeve 27, which is reduced in length at the upper part that supports the flap and the lower part of which may cooperate with the flap to engage the flexible casing. Such a formation of the operating sleeve 27 is illustrated in Figures 15 and 19. As hereinbefore described the sleeve is slidable upon the nozzle 26 and is moved in the manner hereinbefore described with reference to the stuffing mechanism, that is to say, by the stirrup element 29 that is pivoted to the sleeve 27 across the horizontal diameter and moves about a transverse axis above the sleeve, as described with reference to Figure 1 of the accompanying drawings. In a construction that may be adopted with the rectanglar nozzle the rear upper part of the sleeve 27 may be omitted and a single flap 28 hinged to the rear edge of the fore-shortened part of the sleeve, the rear edge of the flap and the under rear part of the sleeve being outwardly dimpled or ribbed, to engage the flexible casings. The stirrup element 29 is coupled to the piston or ram rod 34 in the manner already described.

The manner in which a cage may be associated with the nozzle 26 and the sleeve 27 to be charged with a mass of meat is illustrated by Figure 19. This figure represents a somewhat different form of cradle for the cage in which, instead of rollers running upon rails, the lower edges of the side plates of the cradle 134 rest upon the surface of the table 111, which is formed at two elevations, a longitudinal part, of a width slightly less than the width between the side plates of the cradle, being slightly raised above the remainder of the table surface, to form a slideway for the cradle. The manner in which the cradle is moved into and out of the operative position and is restrained against rearward movement while being charged is substantially as hereinbefore described.

In carrying out the operation of charging

a cage with a compacted mass of meat enclosed within a flexible casing, the piston rod is first moved rearwardly to carry the sleeve 27 rearwardly and thus to permit the flap 28 to incline downwardly. A flexible casing is then engaged with the flap and the lower part of the sleeve and the trailing end entered into the cage 131, the cradle 134 supporting it being then in the retracted position. The piston rod 34 is then moved forwardly and thus causes the sleeve 27 and the flap 28 to move forward firmly to hold the flexible casing by the consequential upward movement of the flap. In this movement, as has already been explained, the extension rod 119 will not only move the cradle 134 and the cage 131 into the operative position in relation to the nozzle 26, but will also erect the stop or cam elements 128 to maintain the cage in the operative position. After the mass has been received within the flexible casing and in the cage, the ram or piston rod 34 and its extension 119 are moved rearwardly to carry with them the sleeve 27 and to collapse the flap 28, for the release of the flexible casing, and at the same time the forward clip or driving element 124 upon the extension rod 119 engages the downwardly depending driving lug 121 of the cradle 134 and moves the cradle together with the cage rearwardly, the retractable stop or cam elements 128 being permitted to move to their inoperative positions on the withdrawal of the rollers 126 from their support.

In preparation for the smoking operation, the meat masses enclosed with the flexible casings and within the cages may be forced to one end of the respective cages for the application of clips or other fastenings to one or the open end of the flexible casing in each instance. The cased masses may then be forced to the other end of the cages if the second end of the flexible casings require to be closed by a clip or fastener, if necessary after the tightening of the casings about the enclosed meat masses, in a manner such as that hereinbefore described. End cover plates may then be applied to the open ends of the cages if required and such cover plates may serve as abutments for spring-pressed presser plates which confine the cased masses of meat, preferably at the middle of the cages. Substantially the same procedure may be adopted in the event that the metal cases are required to be used with flexible plastic or fibrous casings for the compressed meat masses to be boiled or steamed.

WHAT WE CLAIM IS:—

1. A machine for preparing boneless meat masses for cooking or other final treatment for marketing, by stuffing or encasing the meat masses in flexible casings of fibrous or plastic material, comprising a work table having a longitudinal meat trough and complementary cover plate for imparting to a meat mass the cross-sectional shape required of the end product and open at least at one end, the cover plate being adapted for movement to the trough under pressure to close the trough and from the closed position to open the trough and to remain always parallel to the surface of the work table in these movements, an end closure plate for the trough and the cover plate, a nozzle for substitution for the end closure plate, a pressing plate or plunger within the trough which is movable at least through the length of the trough and the nozzle, a sleeve carrying at least one pivoted flap for the engagement of one end of a flexible casing to receive a compressed meat mass, and a clipping mechanism for sealing the open end or ends of the flexible casing containing the meat mass by means of a deformable clip, staple or fastener.

2. A machine for preparing boneless meat masses for cooking, smoking or other final treatment for marketing, by stuffing or encasing the meat masses in metal cases or cages, comprising a work table having a longitudinal meat trough and complementary cover plate for imparting to a meat mass the cross sectional shape required of the end product and open at least at one end, the cover plate being adapted for movement to the trough under pressure to close the trough and from the closed position to open the trough and to remain always parallel with the surface of the work table in these movements, and end closure plate for the trough and the cover plate, a nozzle for substitution for the end closure plate, a pressing plate or plunger within the trough is movable at least through the length of the trough and the nozzle, and means for positioning the metal cases or cages in close proximity to the nozzle to receive the compressed meat masses from the nozzle.

3. A machine according to Claim 1 or 2, in which the table is formed with seatings for the reception of exchangeable troughs having co-operating supporting means that ensure that the axis of each trough is aligned with the axis of the pressing plate or plunger.

4. A machine according to Claim 1 or 2, in which the trough of the largest diameter or greatest cross-sectional area is integral with the work table and is provided with seatings for the troughs of smaller diameter or cross-sectional area which have co-operating supporting means that ensure that the axis of each trough is aligned with the axis of the pressing plate or plunger.

5. A machine according to any of the preceding claims, in which the trough cover plate is supported by spaced parallel arms adapted, when lifting the cover plate from the operative positions, to move the cover plate out of the vertical plane in which the axis of the trough is disposed.

6. A machine according to Claim 5, in which the cover plate receives its movements

to and away from the trough from an operative member adapted for movement in a vertical plane and disposed beneath the table surface.

7. A machine according to Claim 6, in which the arms supporting the cover plate are pivotally connected to the operating member and are so angularly shaped in planes transverse to the cover plate that, under the constraint imposed by spring action and abutment rollers of fixed position, they move the cover plate transversely to the rear of the trough in the opening movement and register it with the trough in the closing or pressing movement.

8. A machine according to any of the preceding claims, in which, when required for charging the compressed meat masses into flexible casings, the sleeves bearing at least one hinged flap for engaging the flexible casings is movable axially upon the nozzle by means of a stirrup device that is moved by an operating member adapted for reciprocation on an axis parallel with that of the nozzle.

9. A machine according to Claim 8, in which the nozzle is carried by the trough closure plate which is movable transversely to the trough between two positions in one of which the closure plate closes the trough and in the other present the nozzle thereto and in which the coupling of the stirrup with the operating member is such as to permit of the movements of the nozzle away from end to the said member.

10. A machine according to any of the preceding claims except Claim 2, in which the clipping mechanism includes a gripping device for tightening the flexible casing about the contained compressed meat mass before the sealing of the casing end or ends.

11. A machine according to any of the preceding claims except Claim 2, in which the clipping mechanism comprises a housing or frame slotted for the reception of the end of a charged casing, a first or a clip-supporting die member movable in the direction of the slotting of the housing or frame and at least one die member movable in the housing or frame in a direction transverse to the path of the first die member and to the remote side of the casing in the slotting of the housing or frame, the movement of such transversely movable die member or members being imposed by the first die member, which is moved by force applied to it in the direction of the slotting.

12. A machine according to Claim 11, in which the clipping mechanism is provided with a magazine for the deformable clips staples or fasteners that feeds them singly into the path of the clip-supporting die member.

13. A machine according to Claim 11 or 12, in which the clip-supporting die member is provided, in respect of the or each transversely movable die member with a cam surface or guide in fixed relation to it and adapted to impose the required movement of the transversely movable die member or die members into its or their operative position or positions in relation to the slotting of the housing or frame.

14. A machine according to any of Claims 10 to 13, in which the gripping device of the clipping mechanism is adapted to grip the extremity of a charged flexible casing protruding from the slotting of the housing or frame of the mechanism and to tighten the casing about the contained meat mass by increase of the distance between the mechanism and the device.

15. A machine according to Claim 14, in which the gripping device comprises a fixed jaw, a pivoted jaw in the form of a lever, an operating lever pivoted to and adapted to open and close the pivoted jaw, a strut bearing the fulcrum of the operating lever and having its remote end adapted to pivot and a spring acting upon the pivoted jaw.

16. A machine according to Claim 15, in which the position of the remote end of the strut of the gripping device is adjustable.

17. A machine according to Claim 16, in which the adjustment of the position of the remote end of the strut of the gripping device is effected by an adjusting screw and a compression spring.

18. A machine according to any of the preceding claims, in which those parts or members that are required to exert pressure or to act against resistances are operated by pneumatic or hydraulic cylinder devices.

19. A machine according to Claim 18, in which the cylinder device effecting the movements of the trough cover plate is controlled by widely spaced control devices that are in series connection when it is moving the cover plate to the closed position.

20. A machine according to any of Claims 2 to 9 or 18 or 19, in which the compressed meat masses ejected from the nozzle are received into tubular metal cases or cages with open ends.

21. A machine according to Claim 20, in which a meat mass is encased in a flexible casing of fibrous or plastic material as it passes into the case or cage to receive it.

22. A machine according to Claim 20 or 21, in which each case or cage is adapted to be closed at the ends by closure plates.

23. A machine according to Claim 22, in which each case or cage is adapted to receive at least one presser plate that is spring-pressed to apply pressure upon the contained meat mass, an end closure plate acting as an abutment for the spring.

24. A machine according to any of Claims 2 to 9 or 18 to 20, in which the position of a metal case or cage in relation to the nozzle of the machine is determined by seatings, stops or the like.

25. A machine according to Claim 24, in which a case or cage is moved automatically into operative relation with the nozzle.

26. A machine according to Claim 25, in which the case or cage is constrained by force to move into the operative position in relation to the nozzle on rails or in a cradle that is movable upon the supporting surface or table.

27. A machine according to Claim 26, in which an operating element that reciprocates along an axis parallel with the axis of the trough serves to advance a case or cage into the operative position.

28. A machine according to Claim 27, in which the operating element is that which serves to move the stirrup of the nozzle sleeve.

29. A machine according to Claim 27 or 28, in which the operating element is adapted to erect a retractable stop or stops to constrain the case or cage against rearward movement when positioned operatively in relation to the nozzle.

30. A machine according to Claim 14, in which the gripping device comprises a fixed and a movable jaw co-operating to grip the end of the flexible casing to be sealed.

31. A machine for stuffing or encasing boneless meat masses in flexible casings of fibrous or plastic material or in metal cases or cages and for sealing the ends of the flexible casings, substantially as hereinbefore described with reference to the accompanying drawings.

UNITED GAS INDUSTRIES LIMITED,
By J. C. BAGGETT,
Secretary.

Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1962.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

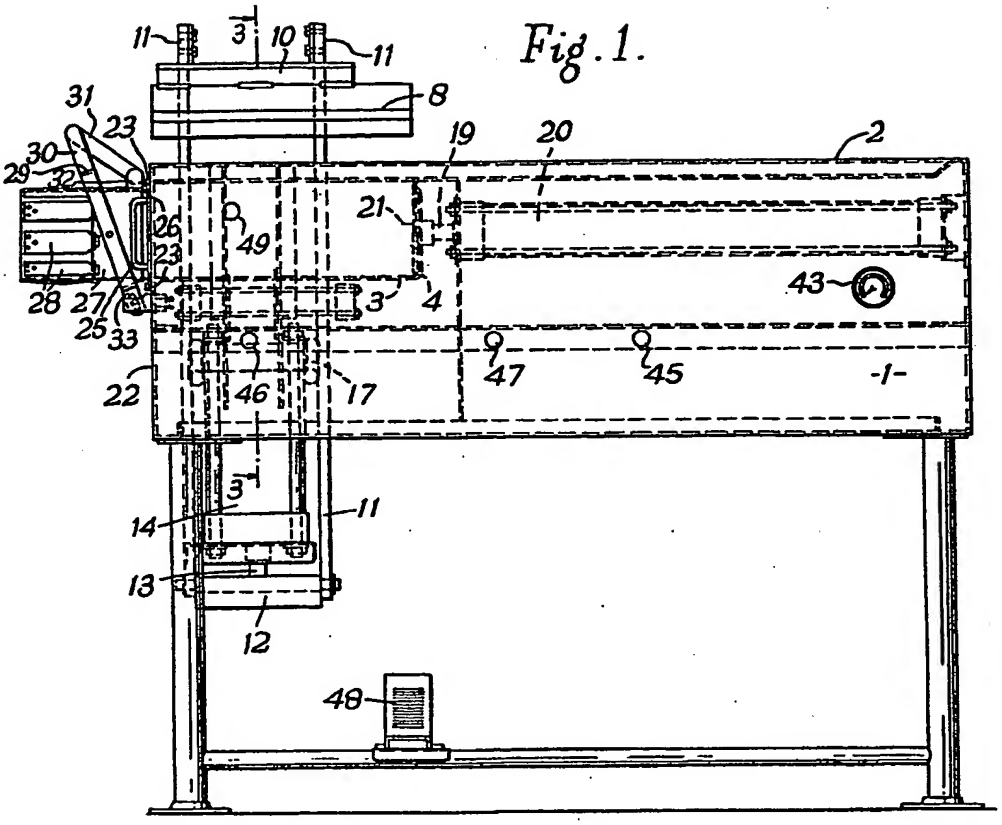
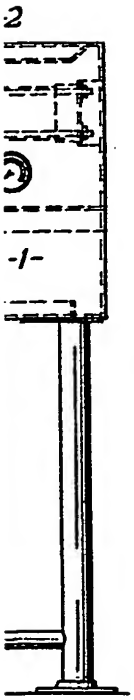

11
3
10
11
8
31
23
19
20
2
30
29
32
21
26
23
49
43
28
27
25
33
3
4
47
45
-1-
22
46
17
3
14
11
13
12
48

Fig. 1.

909,778 COMPLETE SPECIFICATION
7 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2



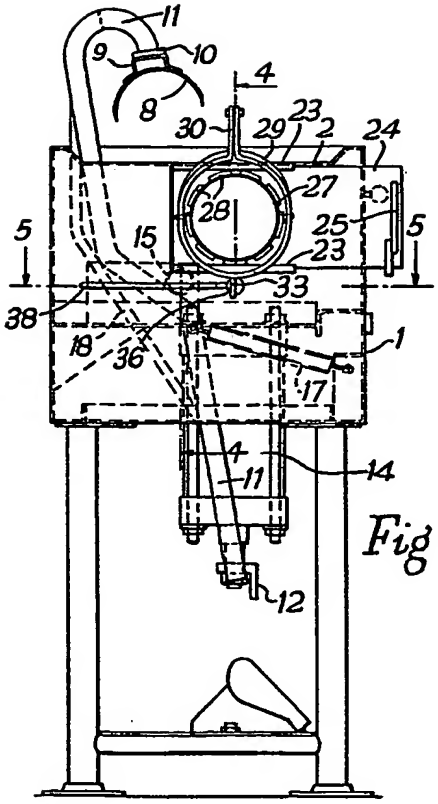


Fig.2.

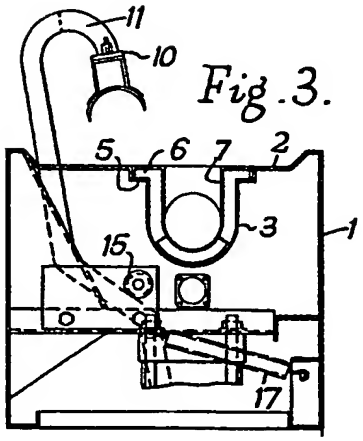


Fig.3.

Fig.4.

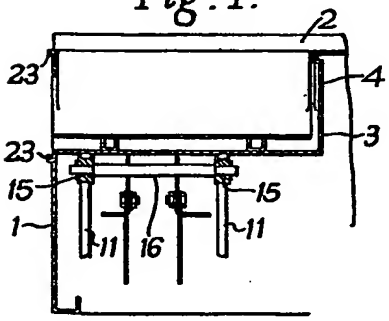
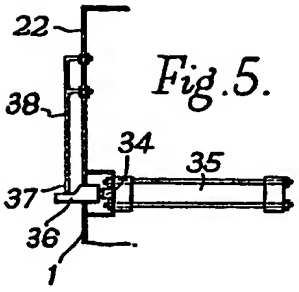


Fig.5.



909,778 COMPLETE SPECIFICATION
7 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

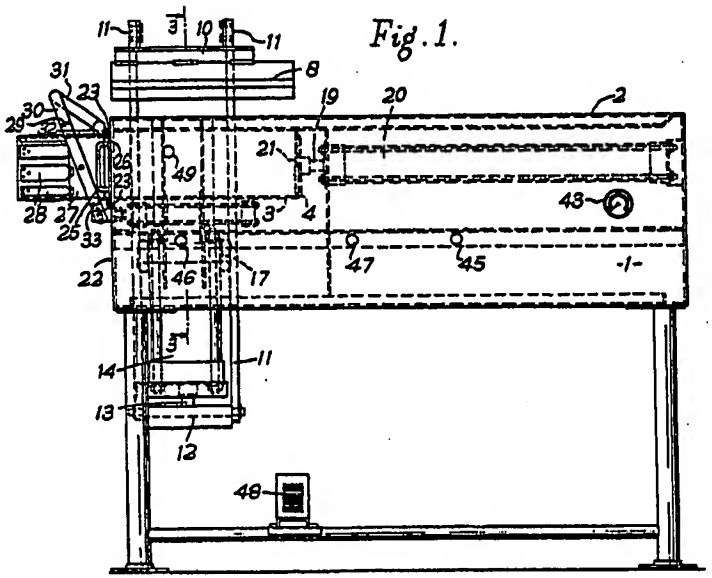


Fig. 1.

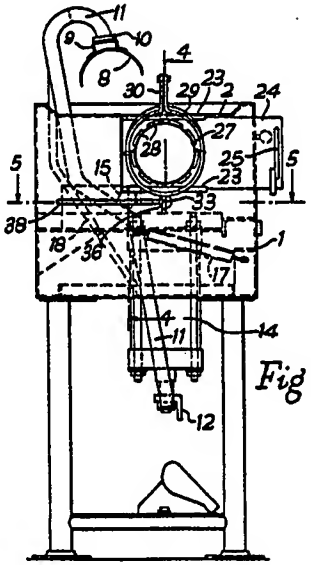


Fig. 2.

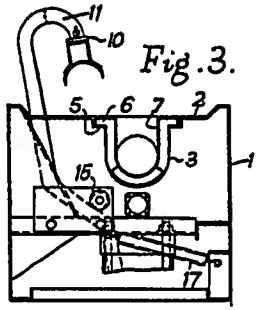


Fig. 3.

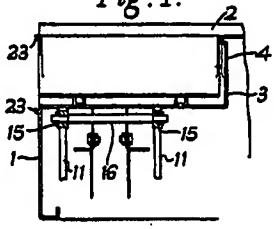


Fig. 4.

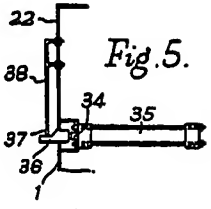


Fig. 5.

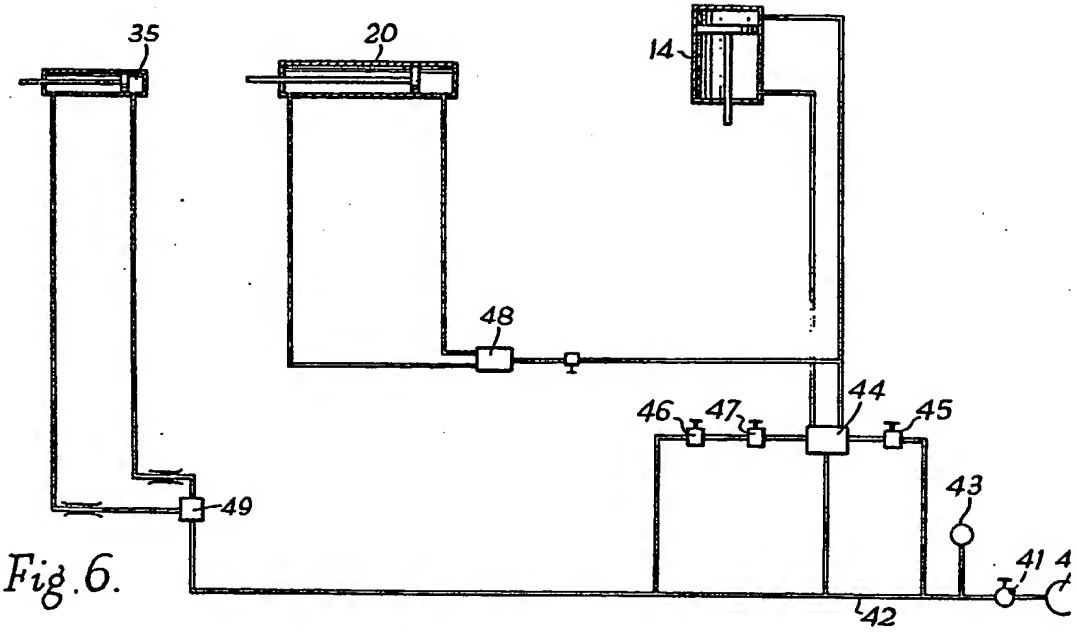


Fig. 6.

909,778 COMPLETE SPECIFICATION
7 SHEETS

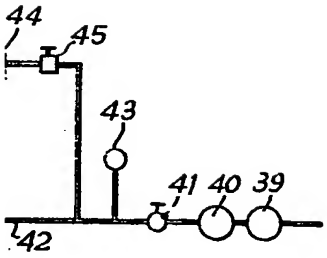
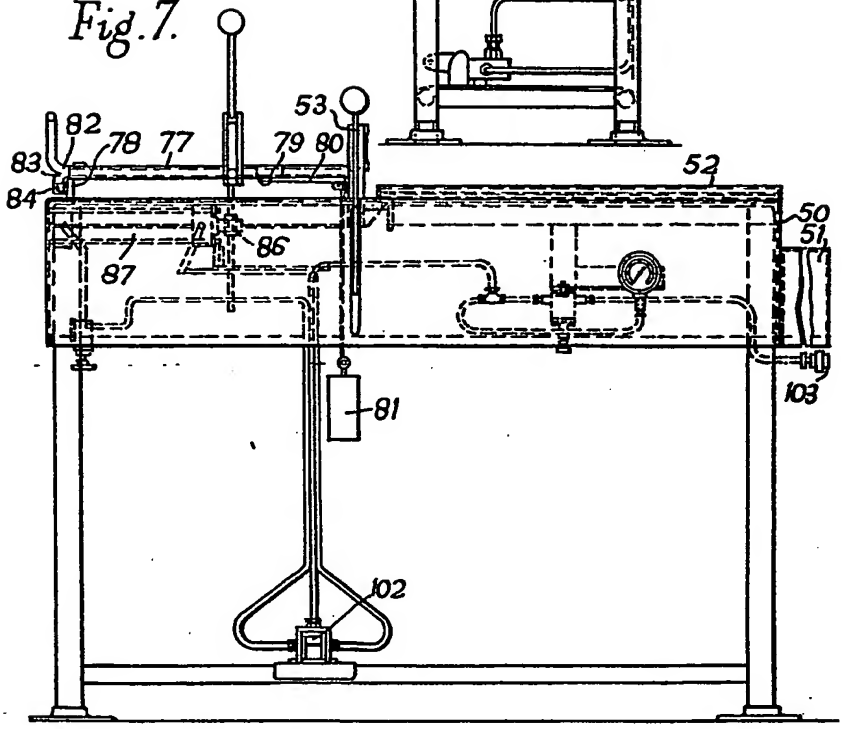


Fig. 7.



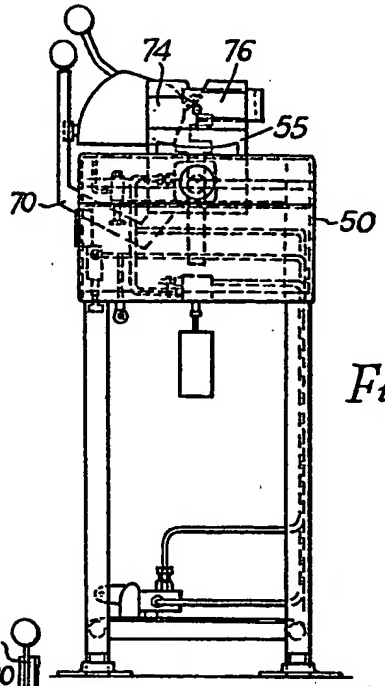


Fig. 8.

909,778 COMPLETE SPECIFICATION
7 SHEETS

SHEET 3

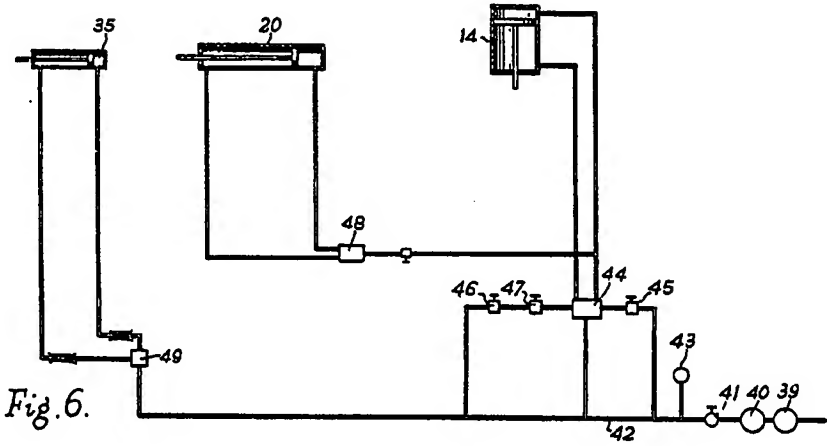


Fig. 6.

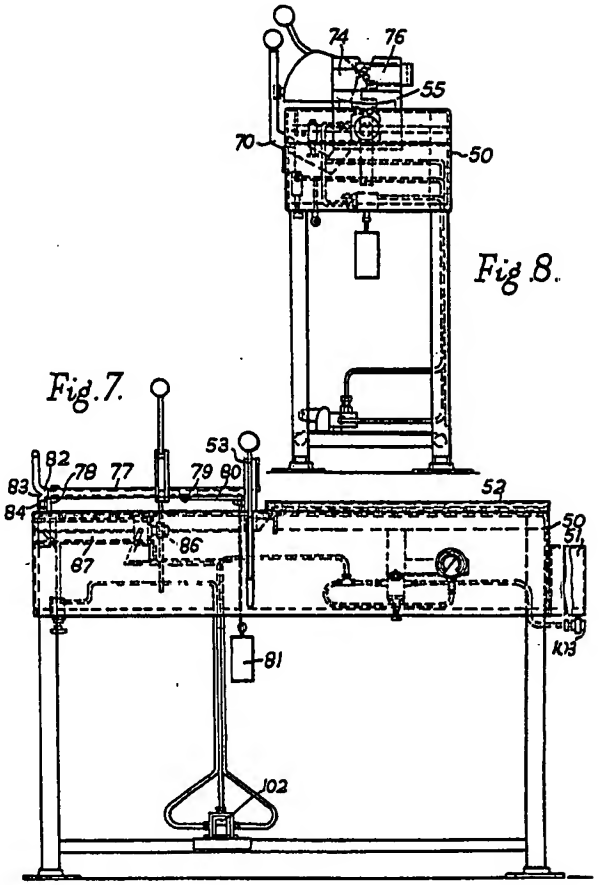


Fig. 8.

Fig. 7.

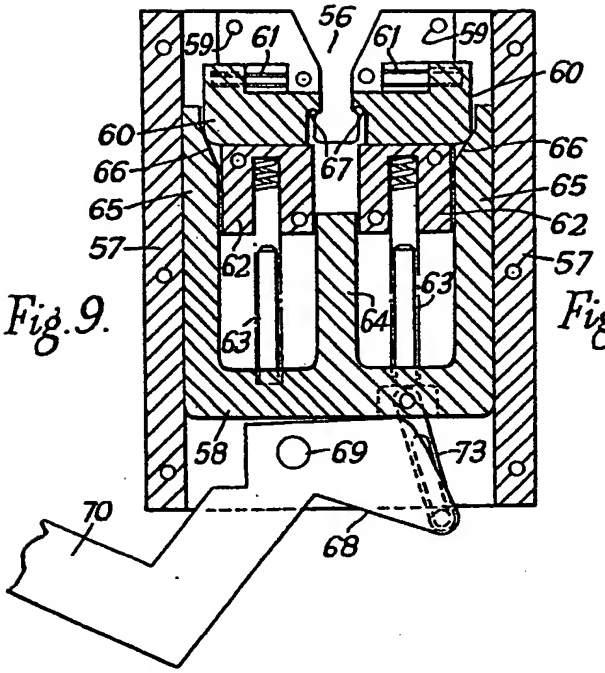


Fig.9.

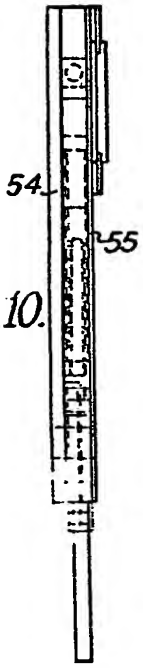
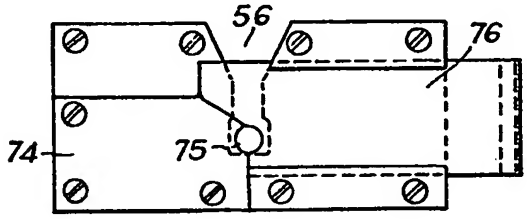


Fig.10.

Fig.11.



909,778 COMPLETE SPECIFICATION
7 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 4 & 5

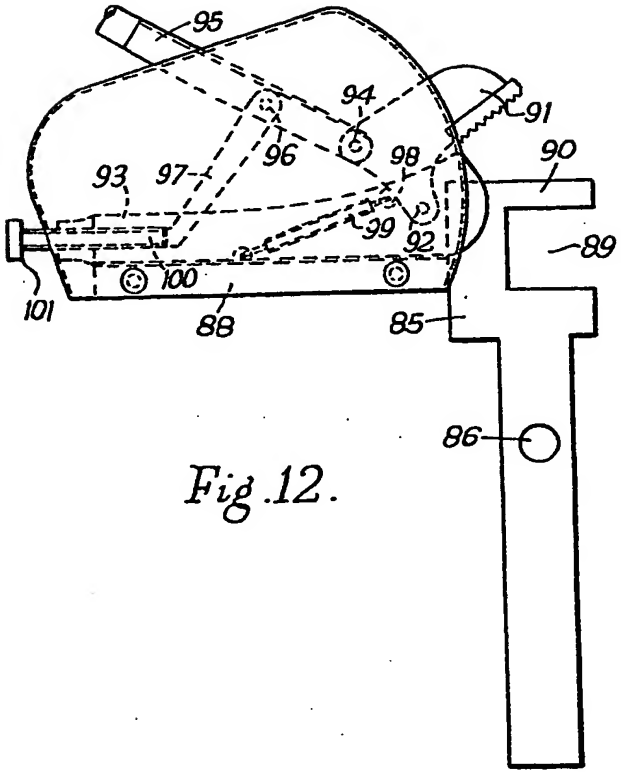


Fig. 12.

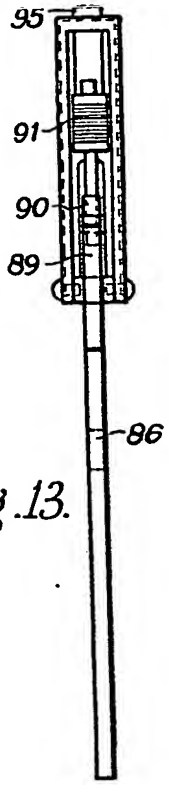


Fig. 13.

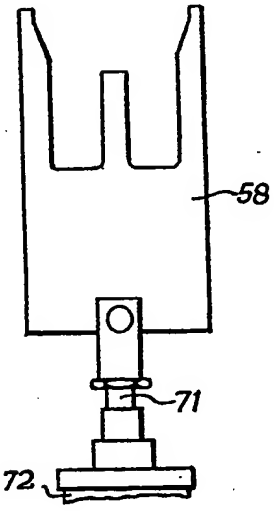


Fig. 14.

909,778 COMPLETE SPECIFICATION
7 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 4 & 5

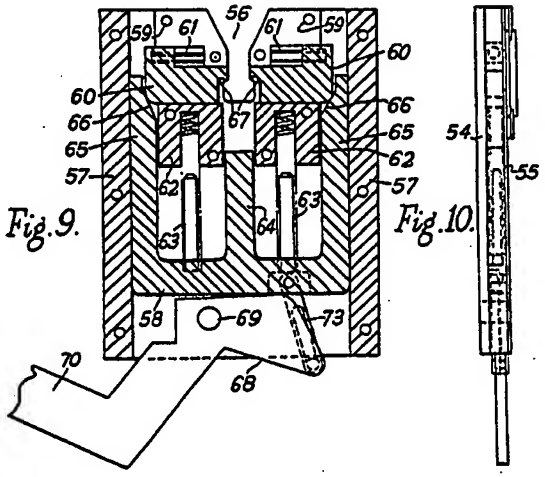


Fig.9.

Fig.10.

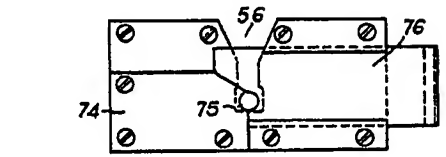


Fig.11.

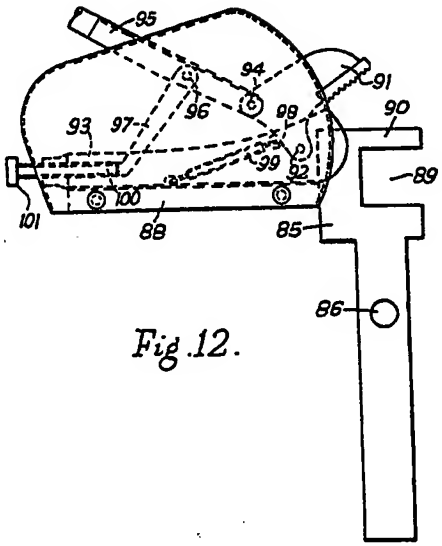


Fig.12.

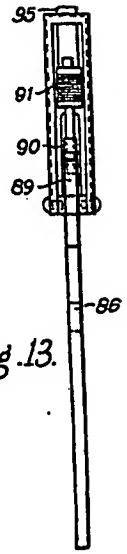


Fig.13.

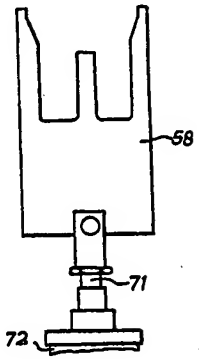


Fig.14.

909,778 COMPLETE SPECIFICATION
7 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEET 6

Fig.16.

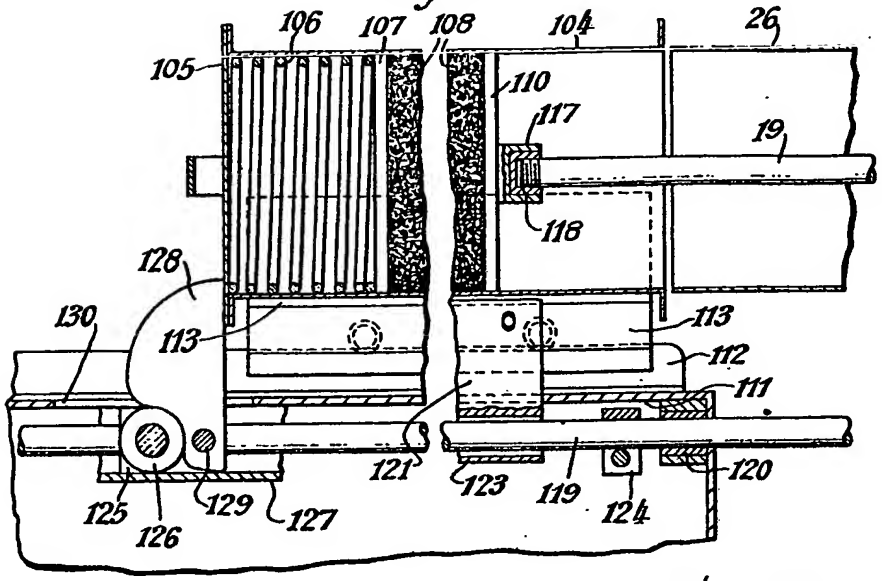


Fig.17.

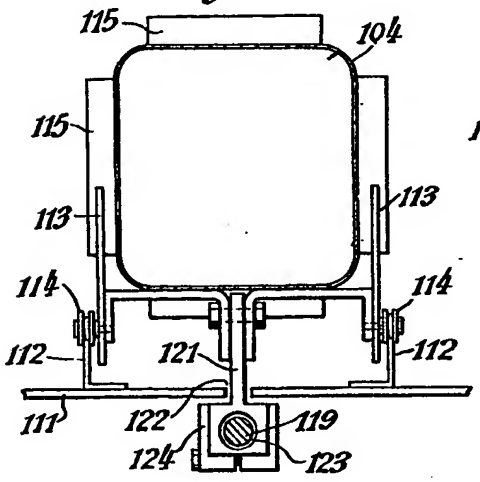
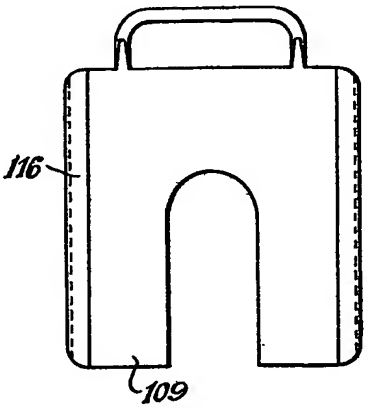
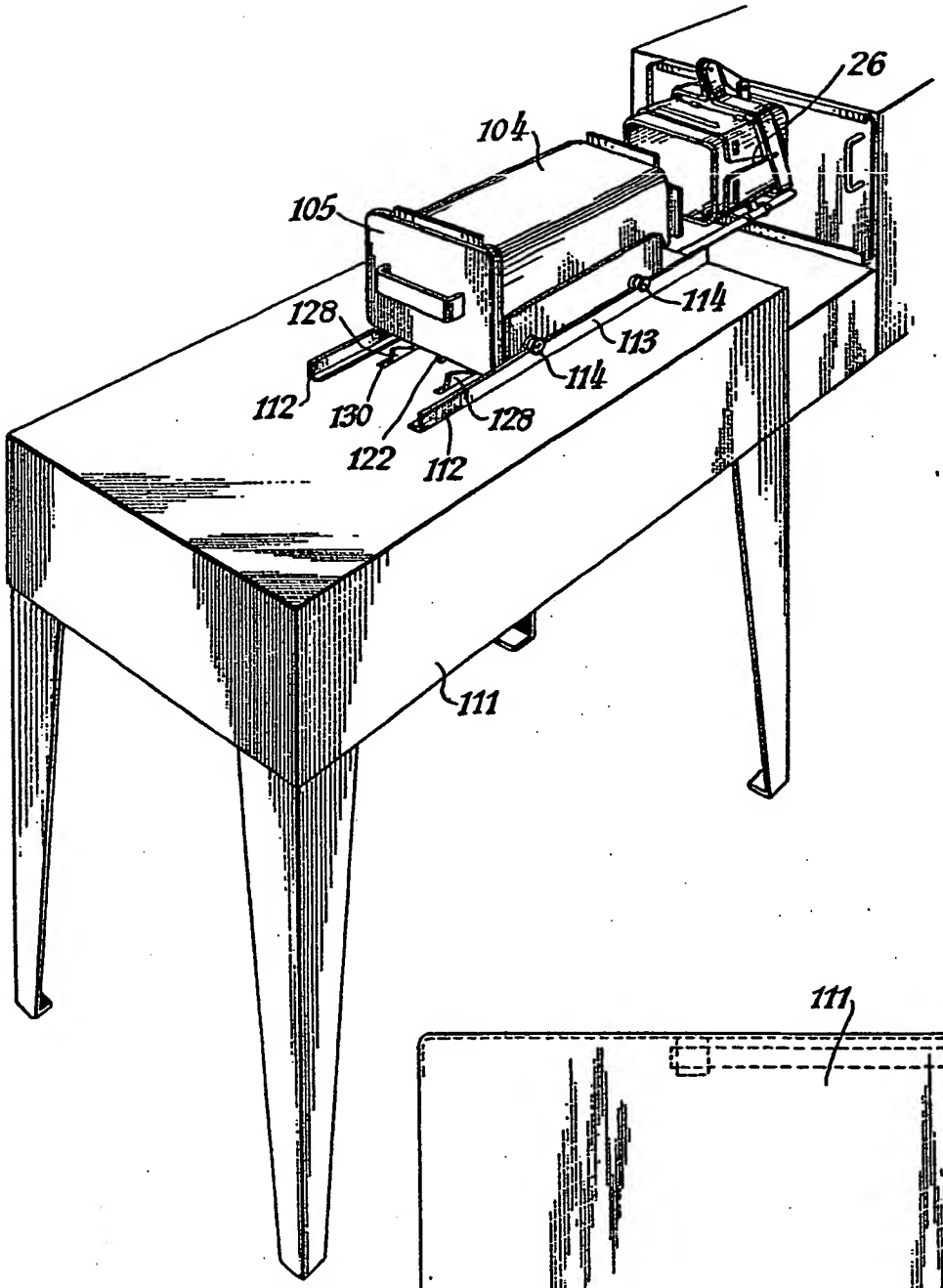


Fig.18.




26
104
105
128
112
130
122
112
128
114
113
114
111

111

909,778 COMPLETE SPECIFICATION
7 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 7

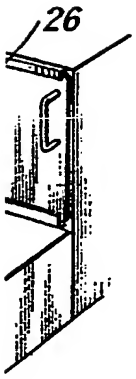
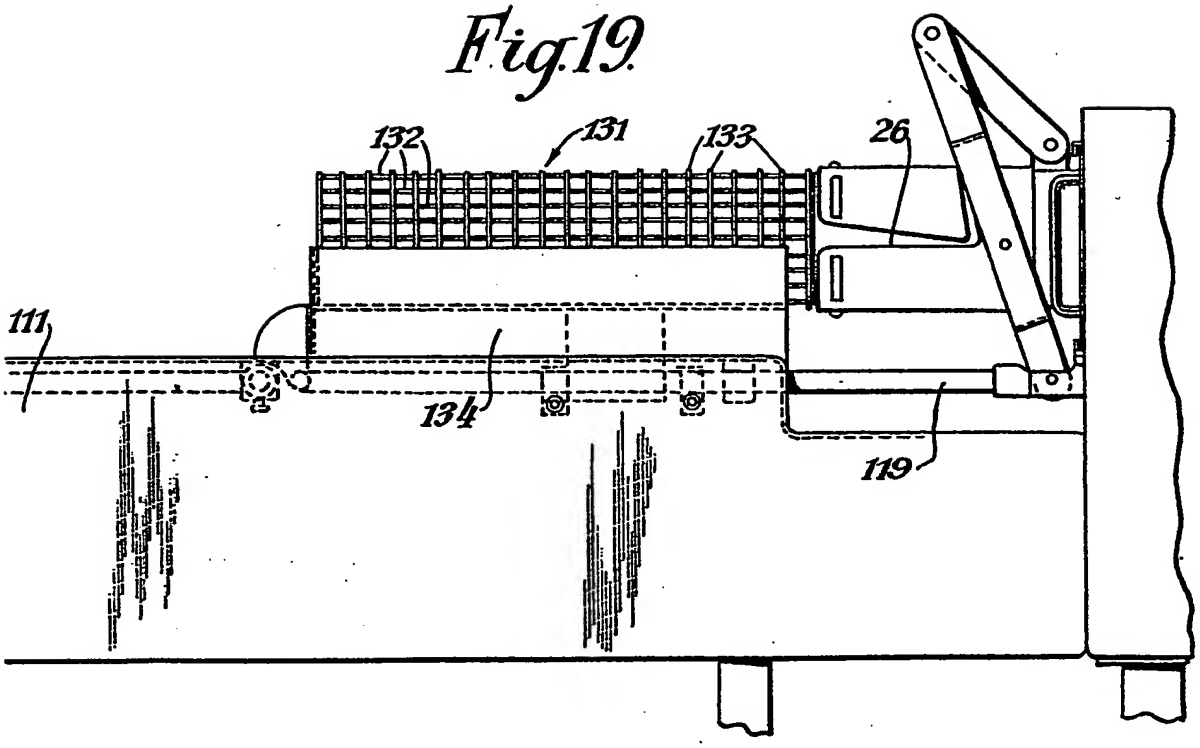


Fig. 15.

Fig. 19.



909,778 COMPLETE SPECIFICATION
7 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEET 7

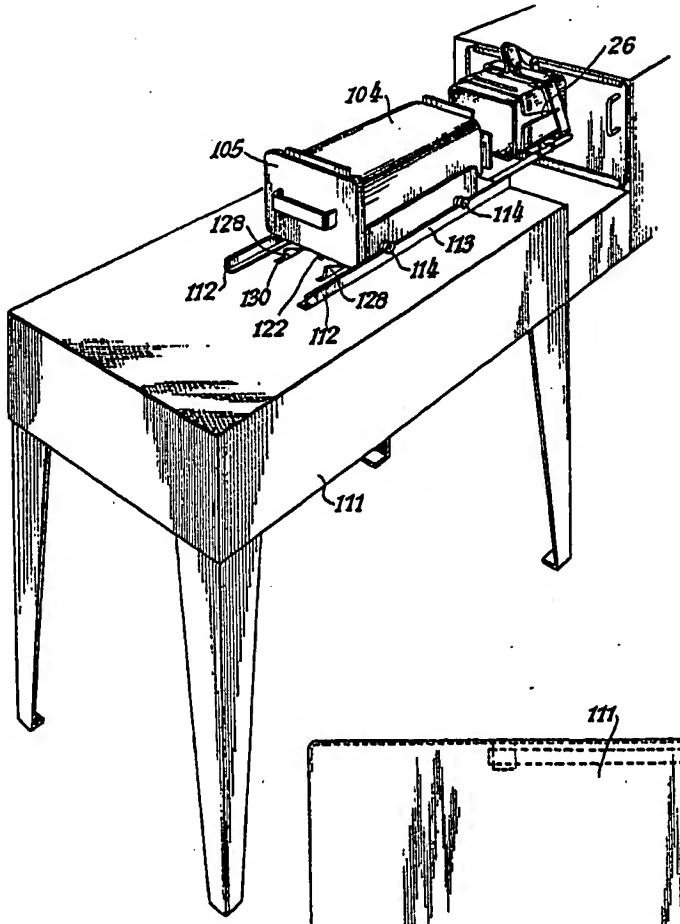


Fig. 15.

Fig. 19.